TEACHER EVENT CHECKLIST
EARTH ACCORDING TO WORF (Imagery)

Date Completed	PRE-EVENT REQUIREMENTS
	1. Print out a copy each of this entire .pdf file (color copy preferred). Please note: this document is 11 pages long.
	2. Have students take Pre-Event Quiz on page 5.
	3. Complete all pre-event activities with the students on pages 4 to 9.
	4. Teacher to E-mail a minimum of 5 student questions to our office no later than 3 business days prior to your event.
	5. Review NASA Event Guidelines with students on page 10.
	DAY OF EVENT ACTIVITIES
	1. The students will be asked to share their results from their pre-work activities with the NASA DLN presenters.
	POST EVENT REQUIREMENTS
	1. Have students take Post-Event Quiz to demonstrate knowledge of subject.
	2. Teacher(s) and students to fill out event feedback.
	3. Digital Learning Network will respond to any follow-up questions.
	4. At teacher's discretion, students can complete extended activities.

Instructional Goal:

Upon successful completion of this learning module, students will be able to analyze images from space, relate it to geography and apply the acquired information to predict future outcomes.

Learning Objectives:

1. Students will be able to define geography and how it is used to answer questions about physical and human interactions.

2. Students will be able to use interpretive skills to identify observable characteristics that provide new insights and understandings about the physical and human aspects of our planet.

3. Students will be able to compare changes between two images from the same location at different time periods and predict future outcomes.

National Education Standards
Science Standards (NSTA)

Science As Inquiry (K-12)
Abilities necessary to do scientific inquiry
Understandings about scientific inquiry

Earth and Space Science (K-4)
Changes in earth and sky

Science and Technology (K-12)
Understandings about science and technology

Science in Personal and Social Perspectives (K-4)
Changes in environments
(5-8)
Populations, resources, and environments
Natural hazards
(9-12)
Natural resources
Environmental quality
Natural and human-induced hazards

WORF: World Observation Research Facility

Grade Level:

Grades K-12

Time requirements:
2 - 3 class periods
1 – Fifty (50) minute video teleconference

National Geography Standards (K-12)

Places and Regions
Standard #4
Identify and analyze the physical and human characteristics of places.
Standard #5
The similarities and differences among regions

Physical Systems
Standard #7
The physical processes that shape the patterns of Earth's surface

Human Systems
Standard #12
The processes, patterns, and functions of human settlement

TEXAS EDUCATION KNOWLEDGE AND SKILLS (TEKS)

	Science
(Grades K - 4)	K.5.B 1.10.A 2.10 3.6.B 4.10.A
(Grades 5- 8)	5.11.A 5.12.A 7.14.A,B,C 8.14C
(Grades 9-12)	**Environmental** 112.44.8.A

OVERVIEW

Natural and Man-Made features on the Earth's surface typically demonstrate characteristic colors, shapes, and patterns. These observable characteristics will help us make decisions on where to live, how to plan our future, and how to keep our planet healthy. Join NASA's Digital Learning Network as we work together to develop interpretive skills and learn how to look at space-based photography the same way Earth observation scientist do at NASA.

INSTRUCTIONAL STRATEGY

Pre-Event Classroom Component

Class Activity #1

1. Students to take Pre-Event Quiz on page 5 to test their knowledge prior to these lessons about geography. Students keep these quizzes on file to compare to their Post-Event Quiz.

2. Ask students about their perceptions of geography. For example, ask the question, "what do you think when you hear the word 'geography'?" (Field responses from the students without trying at this point to correct any misconceptions.)

3. Define geography as a class and develop a sense for a use of geography.

Class Activity #2

1. Activity #2 will give the students a start at becoming NASA geographers interpreting location, time, season with pictures and/or photographs from home.

Class Activity #3

2. Select the appropriate grade level activity for your students.
   Activity #3a for grades K-4 or Activity #3b for grades 3-12

Activity #1
Pre/Post Event Quiz

1. **Write a definition for geography.**

2. **List three ways geographers might use information they gather from space based photography to answer questions about changes on the earth?**

3. **What is happening to our forests and rivers that will affect humans in the future?**

4. **What do the gray areas in satellite images generally represent?**

5. **What can you tell about this picture? What do the colors represent? (If you have a colored copy)**

Mississippi River Delta

Pre-Post Quiz
Answer Key

1. **Write a definition for geography.**

   Geography is the science of space and place on Earth's surface. Its subject matter is the physical and human phenomena that make up the world's environments and places…"

2. **List three ways geographers might use information they gather from space based photography to answer questions about changes on the earth?**

   Some answers may include but are not limited to…

   a) where to live
   b) where to build
   c) how to plan our future
   d) how to keep our planet and ourselves healthy

3. **What is happening to our forests and rivers that will affect humans in the future?**

   Students should identify pollution, deforestation, erosion…. Etc.

4. **What do the gray areas in satellite images generally represent?**

   Cities, cement structures, man-made structures.

5. **What can you tell about this picture? What do the colors represent? (If you have a colored copy**)

   MISSISSIPPI RIVER DELTA
   Blue – water
   Green – shallow water
   Light brown/tan – land
   Reddish brown – sediment
   Green – vegetation
   ….?

ACTIVITY #2
(Grades K-12)

Materials

- Photographs from home
- Postcards, pictures from magazines, etc.

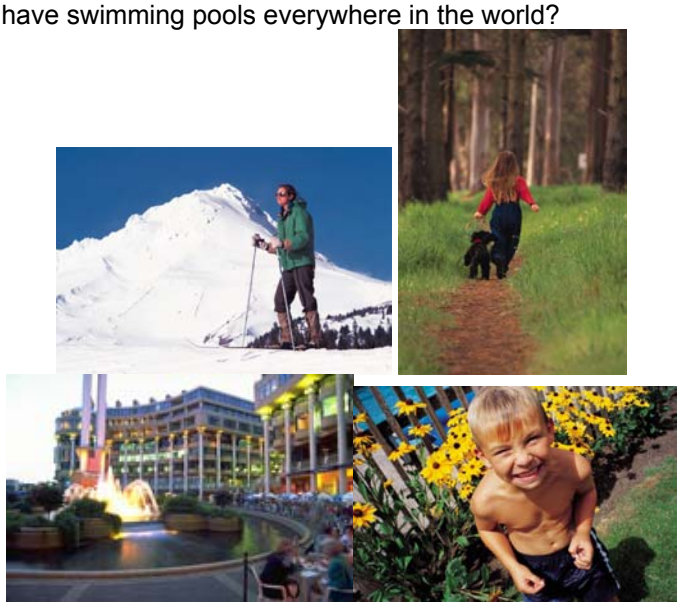
Procedure

1. To get your geographers ready to analyze images, do this activity.

    a. Have them bring in photographs of their families or events in their lives. (You can bring in postcards to add some other types of pictures to the group.) Be sure their names are on the back of the photo.

    b. Talk about the details of the pictures and discuss the details and what information they give you.

        For example: In the pictures below, ask the students if they can tell you what season it might be and how they came up with that answer. What other information can be drawn from the details? Could you get as specific as whether or not those types of flowers are grown in certain areas? What about the boys wet hair and what type of water is behind him? Do they have swimming pools everywhere in the world?



2. Now that the students are in the mode of analyzing photos, let's learn some specific skills that will assist them as they look at the photos taken by the astronauts in space. In the next class activity they will begin to look at the photos taken by astronauts in space and identify geographical features using color, shapes, and patterns.

Activity #3a
(Grades K-4)

THE ADVENTURES OF ECHO THE BAT
Ordering information for the book is located below under **CORE CATALOG** below.

Materials
- Echo the Bat book

OR
- Computer with Internet access

Background
This picture book of Echo the Bat teaches the concepts of remote sensing throughout a story of a young bat lost in Arizona. Pop-up images are incorporated into the satellite images to assist the child in recognizing land features narrated in the story. The book is accompanied by a set of activities that reinforce four basic themes or concepts fundamental to the interpretation of satellite imagery: perspective, shape and pattern, color, and texture. Activities and activity sheets are provided on the companion web site listed below.

Procedure
You may not receive the book in time to complete this activity with the book in your classroom before the NASA event but the website will provide useful information for before and after the event.

The Adventures of Echo the Bat Website – Computer needed (Grades K-4)
http://imagers.gsfc.nasa.gov/k-4/index.html
This website provides activities for your students along with a teacher's guide.

Main site page: http://imagers.gsfc.nasa.gov/

CORE CATALOG
http://catalog.core.nasa.gov/core.nsf/5f9c4a5adae3d29e8625670d004edb64/c93b8230e3e34fda86256ac70058634b?OpenDocument. This link gives you details about the book. You can click on HOW TO ORDER at the top to order the book.

Activity #3b
(Grades 3-12)

Materials

- Computer with Internet access

Procedure

1. Inform the class that they are going to look at some of these pictures and learn just how valuable a geography tool they can be. Divide the class into five small groups to perform in teams.

2. The interpretive skills we would like your students to explore are Color, Shapes, and Patterns. What are the observable characteristics that will help your students recognize certain natural and man-made objects and then allows them to interpret the conditions observed in these Images from Space?

   Color – Vegetation, Ocean, River, Lakes, Man-Made Objects (cities, roads, bridges)
   Shapes – Coastlines, Rivers, Lakes, Mountain Ranges, City (homes vs. work buildings)
   Patterns – Man-Made vs. Natural structures and objects.

3. This activity from EarthKAM enables the students to choose different geographical features and become familiar with what they look like in the pictures from space.
   http://www.earthkam.ucsd.edu/public/students/activities/landformations/

   The students can click through on their own or you can direct them and discuss each picture. During the event with the DLN, similar pictures will be shown and the students will be asked to identify the geographic feature.

4. Other images we would like for your students to work on before the videoconferencing event. The page will have a small thumbnail picture with a description of the picture. Click on the JPEG link to bring up a larger picture for your students to see on the computer monitor or print a hardcopy. The background information is for the teachers to see first and then you can determine how much of this information to give to your students.

   a. Earth's City Lights
      http://visibleearth.nasa.gov/cgi-bin/viewrecord?5826

   b. City Lights of Europe
      http://visibleearth.nasa.gov/cgi-bin/viewrecord?6529

   c. Washington D.C. Gray Scale
      http://visibleearth.nasa.gov/cgi-bin/viewrecord?368

   d. Washington D.C. Infrared
      http://visibleearth.nasa.gov/cgi-bin/viewrecord?5369

5. Once the students have had the opportunity to look at the pictures and analyze them, query the students about what they observed in the photos. Ask questions such as:
   a. What do you think this is a picture of?
   b. Do you recognize any of the features?
   c. What questions come to mind as you look at the picture?
   d. Is there something in the picture that you want to know more about?
   e. After studying the picture, what can you tell me about it?
   f. What do you think a geographer or an early scientist looks for in a picture like this?
   g. Would this be a good place for a city? Why?
   h. Are there problems with the environment in this area?
   i. What types of geographic features are located here?

NASA Event Guidelines

Review the following points with your students prior to the video teleconference event:

1. A video teleconference is a two-way event. Students and NASA presenters can see and hear one another.
2. Students are representing their school; they should be on their best behavior.
3. Students should be prepared to give brief presentations, ask questions and respond to the NASA presenters.
4. A Teacher(s) or other site facilitator should moderate students' questions and answers.
5. Students should speak into the microphone in a loud, clear voice.

Get Ready, Be Ready, and have fun with your Digital Learning Network Event with NASA!

Post-Event Teacher – Student Evaluation

Post Event Follow Up And Assessment

We need your help and support! We welcome any input that you have. Providing us with feedback usually takes teachers and students **less than 10 minutes** to complete. Choose the appropriate feedback form at the following sites:

Educators

https://ehb2.gsfc.nasa.gov/edcats/nasa_wide/dln_educator.html

Students
https://ehb2.gsfc.nasa.gov/edcats/nasa_wide/dln_student_feedback.html

1. Students and Teachers are **welcome to e-mail the Digital Learning Network** with any follow-up questions from the event at: DLO1@jsc.nasa.gov

2. **Please send** us any photos, video, link to your school's/organization's webpage, newspapers articles, etc. of your event and we will be glad to post them on our webpage!

Extended Activities For Earth According to WORF

1. Clicking on the images will open a page that will provide greater information. Students can locating and labeling different details on each image. Click on **Rotated Image** and then **Annotated Image** and the labels of the different details will appear. The students can see if their labels were correct. http://www.earthkam.ucsd.edu/public/students/activities/imageCaps/

2. The Gateway to Astronaut Photography http://eol.jsc.nasa.gov/

3. Essay Activities http://www.tsgc.utexas.edu/essays/

4. NASA Explores has a great activities divided into the grade levels

    a. Hello Down There!
        i. (K-4) http://www.nasaexplores.com/search_nav_k_4.php?id=02-056&gl=k4
        ii. (5-8) http://www.nasaexplores.com/search_nav_5_8.php?id=02-056&gl=58
        iii. (9-12) http://www.nasaexplores.com/search_nav_9_12.php?id=02-056&gl=912

5. Exploring Remote Sensing and Electromagnetic Spectrum (Grades 9-12)
    a. This site takes you through a tutorial with more details about remote sensing, electromagnetic spectrum, satellite technology, etc. http://www.ccrs.nrcan.gc.ca/ccrs/learn/tutorials/fundam/chapter1/chapter1_1_e.html
6. For Kids Only -- Earth Science Enterprise
    a. Learn how NASA studies People, Land, Water, Air and National Hazards at http://kids.earth.nasa.gov/